

REMARKS

Claims 1-2 and 8-11 are pending. By this Amendment claims 1, 8, 9 and 11 are amended.

The Office action rejects claims 1 and 2 under 35 U.S.C. 112, second paragraph. Claims 1, 8, 9 and 11 have been amended to clarify that the proportion of functional groups per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%. Accordingly, it is submitted that the claims are definite and Applicants request withdrawal of the rejection.

The Office Action rejects claims 1-2 and 9-10 under 35 U.S.C. § 103(a) Yokosawa (U.S. Patent 6,001,479) in view of Ruhe. This rejection is respectfully traversed.

The present invention includes a magnetic recording medium, which includes a protective coating mainly composed of carbon, that includes at least a functional group having N atoms. As a result of the N atoms on the surface of the protective coating, the capability of absorption of the lubricant is remarkably improved. This is discussed, for example, at page 15, lines 8 to 9, page 18, lines 16-17 and Figure 3 of the specification.

In contrast, Yokosawa discloses a magnetic recording medium comprising a non-magnetic substrate, an magnetic layer, a carbon protective layer and a lubricating layer. However, the protective layer is formed of DLC, and the lubricating layer comprises a lubricant having a polar terminal group in the hydrocarbon lubricant. However, neither Yokosawa nor Ruhe disclose or suggest that the protective coating should include N atoms as a functional group. Accordingly, the combination of Yokosawa and Ruhe cannot render obvious any of claims 1-2 or 9-10.

The Office Action rejects claims under 35 U.S.C. §103(a) over Yokosawa and Ruhe and further in view Hosoe (U.S. Patent 5, 759,681). This rejection is respectfully traversed.

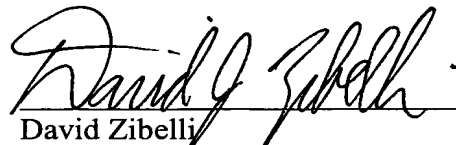
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Claims 8 and 11 both recite the protective coating having at least a functional group having N atoms, as discussed above regarding claims 1 and 9. None of the applied references disclose or suggest the protective coating having a functional group having N atoms. Accordingly, the combination of Yokosawa, Ruhe and Hosoe cannot render obvious claims 8 or 11. Applicants request withdrawal of the rejection.

The Office is authorized to charge any fees due under 37 C.F.R. § 1.16 or 1.17 to Deposit Account No. 11-0600. Should there be any questions concerning this matter, the Examiner is invited to contact Applicants undersigned attorney.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims 1 and 8 as follows.

1. (Twice Amended) A magnetic recording medium, [characterized in that in] the magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, the proportion of functional groups per [1-] 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceed 20%, and includes at least [one of the -COOH, -C=O, and -CNH₂ as the] a functional group having N atoms [, for protecting the magnetic film exceeds 20%].

8. (Twice Amended) A magnetic storage apparatus, comprising a magnetic recording medium that in the magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalatingg at least an under layer, a proportion of functional groups per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceed 20%, and includes at least [one of the -COOH, -C=O, and -CNH₂ as the] a functional group having N atoms, [for protecting the magnetic film exceeds 20%,] and a lubricating film of perfluoroether having at least one functional group provided on the protective coating,

a driving part for driving the magnetic recording medium,

a magnetic head having a recording part and a reproducing part,

a recovery reproducing signal processing part for giving and receiving a signal to and from the magnetic head, and a magnetoresistive head as the reproducing part of the magnetic head.

9. (Amended) A magnetic recording medium, [characterized in that in] the magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, the proportion of functional groups per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%, and [included -COOH, -C=O, -COH, and -CNH₂ as the] includes at least a functional group having N atoms [, for protecting the magnetic film exceeds 20%].

11. (Amended) A magnetic storage apparatus, comprising a magnetic recording medium [that in the magnetic recording medium] having a magnetic film on a [non0magnetic] non-magnetic substrate by intercalating at least an under layer, a proportion of functional groups per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%, and [included -COOH, -C=O, -COH, and -CNH₂ as the] includes at least a functional group having N atoms, [for protecting the magnetic film exceeds 20%,] and a lubricating film of perfluoroether having at least one functional group provided on the protective coating,

a driving part for driving the magnetic recording medium, a magnetic head having a recording part and a reproducing part,

a recording reproducing signal processing part magnetic head, and a magnetoresistive head as the reproducing part of the magnetic head.